

18. (a) Discuss, in detail, the working principle and uses of cyclotron accelerator.  
(b) Write note on atom bomb.
19. (a) Give an account on transuranic elements.  
(b) Discuss any two methodologies to prepare nanoparticles.
20. (a) How would you treat  $\text{CN}^-$  and CO poisoning?  
(b) Evaluate the role of  $\text{Mg}^{2+}$  ion in chlorophylls.  
(c) Outline the mechanism of dinitrogen aided by nitrogenase.
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NOVEMBER/DECEMBER 2024

**GCH22/DCH22 — INORGANIC  
CHEMISTRY II**

Time : Three hours

Maximum : 75 marks

PART A — ( $10 \times 2 = 20$  marks)

Answer ALL questions.

1. What are miller indices?
2.  $\text{AgNO}_3$  is soluble in water whereas  $\text{AgCl}$  is not. Comment on it.
3. Calculate the mass defect and the binding energy (in MeV) of the deuteron. Given:  
 $M_D = 3.34359 \times 10^{-27} \text{ kg}$ ,  $m_p = 1.00728 \text{ amu}$ ;  
 $m_n = 1.00867 \text{ amu}$ .
4. What is the difference between magic and double magic numbers?
5. What is meant by the burning of carbon in stars?
6. What are the advantages of isotopic dilution analysis?
7. What is meant by lanthanide contraction?



8. How bottom up differ from top down approach?
9. Draw the active site structures of deoxy form of hemocyanin and hemerythrin.
10. Point out the biological role of calcium ion?

PART B — ( $5 \times 5 = 25$  marks)

Answer ALL questions.

11. (a) Examine the structures of following  $\text{FeCr}_2\text{O}_4$  and  $\text{NiGa}_2\text{O}_4$ .

Or

- (b) Analyse the structural features of perovskite.

12. (a) Draw the nuclear shell configurations of  $^{15}\text{P}_{31}$ ,  $^{29}\text{Cu}_{63}$  nuclei and predict their spin and parity.

Or

- (b) Calculate the nuclear density of  $^{92}\text{U}_{238}$ . Given:  $R = 1.5$  fermi, mass of each nucleon =  $1.67 \times 10^{-27}$  kg.

13. (a) Write a note on radio immuno assay and its applications.

Or

- (b) Elaborate on neutron activation analysis.

14. (a) Discuss the color of the lanthanide ions in water.

Or

- (b) Write a note on the sensing applications of nanomaterials.

15. (a) Examine the structure and function of carboxy peptidase.

Or

- (b) Draw and explain the mechanism of  $\text{Na}^+/\text{K}^+$  transportation occurring across the cell membrane.

PART C — ( $3 \times 10 = 30$  marks)

Answer any THREE questions.

16. (a) What type of reflections can be commonly seen in both FCC and primitive lattices in cubic crystal systems? Explain with their systematic absences?

- (b) Distinguish Frenkel and Schottky defects in crystals.

17. (a) Discuss, in detail, liquid drop model of the nucleus and its merits.

- (b) Elaborate on nuclear isomerism.